

APPLICATION SHEET

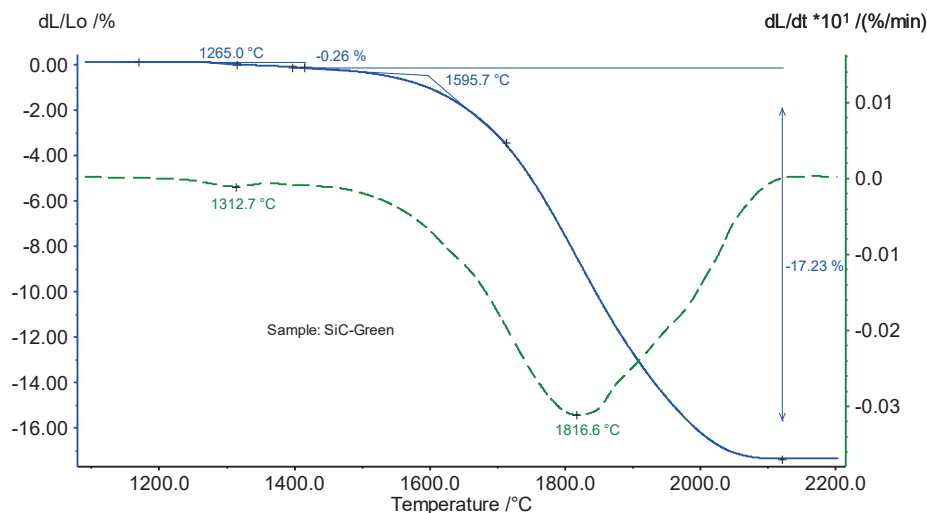
Ceramics · Chemicals
High-Temperature DIL 402

Silicon Carbide

Introduction

Silicon carbide (SiC) is a ceramic compound of silicon and carbon. Mostly silicon carbide is man-made for use as an abrasive (when it is often known by the trademark carborundum), or more recently, as a semiconductor and moissanite gemstones. Alpha silicon carbide (α -SiC) is most common, and is formed at temperatures higher than 2000°C. Alpha SiC has the typical hexagonal crystal

structure. Beta modification (β -SiC), with a face-centered cubic crystal structure, is formed at temperatures below 2000°C, but has relatively few commercial uses. Silicon carbide has a specific gravity of 3.2 g/cm³, and its high melting point (approximately 2700°C) makes silicon carbide useful for bearings and furnace parts. It is also chemically highly inert. SiC has very low thermal expansion coefficient and no phase transitions that would cause discontinuities in thermal expansion.



Test Conditions

Temperature range: 1000°C ... 2200°C
Heating rates: 5 K/min
Atmosphere: Helium
Sample length: 18.66 mm
Calibration: Poco graphite

Test Results

Presented in the plot are the measurement results (thermal expansion) on a silicon carbide green body (SiC powder mixed with a sintering aid) between 1000 und 2200°C. Two sintering steps can be seen in the measurement curve. The first one (maximum shrinkage rate at 1313°C) is due to the reduction of the sintering aids: The second one (maximum shrinkage rate at 1817°C) is due the shrinkage/densification of the green body. The example shows that sintering can be measured even at temperatures around and above 2000°C with a High-Temperature DIL 402..